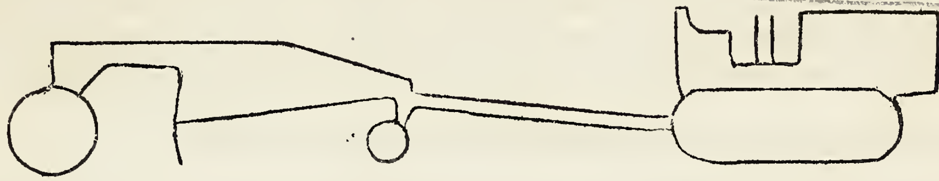
CONSTRUCTION



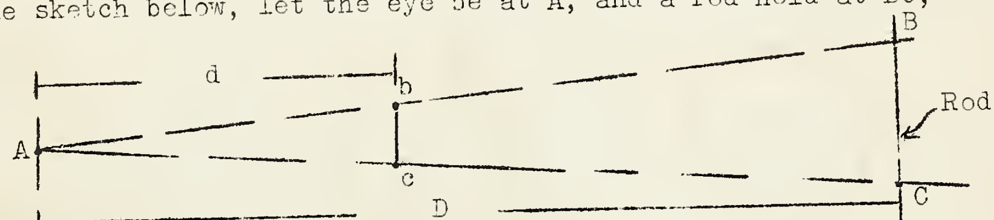
HINTS

UNITED STATES DEPARTMENT OF AGRICULTURE, FOREST SERVICE

Vol. 1 Washington, D. C. October 19, 1935. No. 12

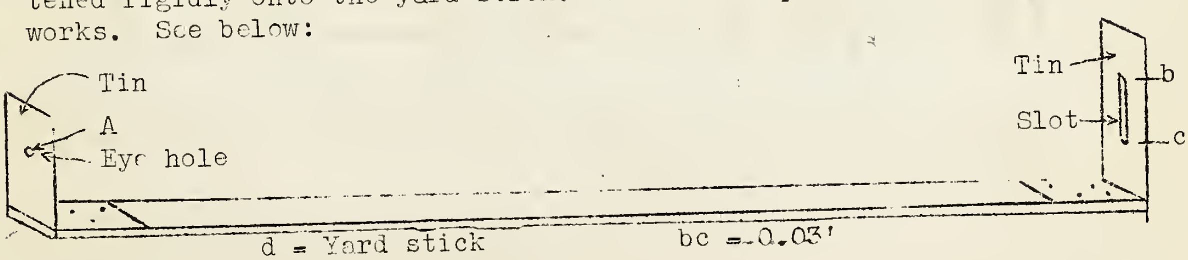
Mr. C. C. Fisher, Superintendent of T.V.A. Camp #42, at Pikeville, Tennessee, has contributed the following from a talk made at a meeting of engineers and camp superintendents.

Stadia: The principles of stadia are simple, and are the same whether on an expensive transit or on a simple home-made device. In the sketch below, let the eye be at A, and a rod held at BC,



then a line of sight from A through "b" will hit B, and a line of sight from A through "c" will hit C. If the distances d and bc are known, then by reading BC on the rod, we can find D by a simple calculation. Any number of combinations can be used, the customary one being to make d = 100 x bc. Then the distance D = 100 x BC.

A neat hand made device is to use three feet, (a yard stick,) for the distance d. Make two metal pieces, one with a small hole for the eye, the other with a narrow slot, to give the measurement bc. The width does not matter, the length of this slot must be equal to bc, or 0.03 ft. These can well be made from old tin cans, and fastened rigidly onto the yard stick. It is a simple device, and it works. See below:



(over)

Region 5 has contributed the following:

Toggle Levers. (J. S. Cotton)

A tremendous force may be developed by arranging two timbers end to end and a foot or so off the ground at their point of contact. A man or several men, putting their weight at the point of contact create a thrust many times their weight. This system is useful for moving heavy machinery or forcing concrete forms into line.

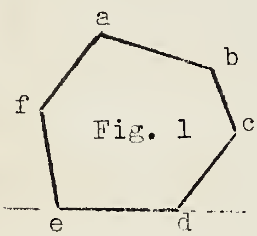
Proper Installation of Cable Clips. (J. S. Cotton)

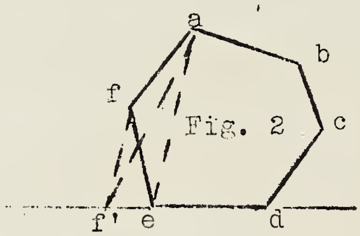
U bolts should be on dead end of cable.

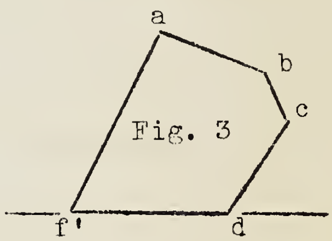
Mr. Fisher, of T.V.A. Camp #42, has contributed the following method of calculation of irregular areas:

Triangle method. In this method we resolve the given area into a triangle of equal size. This is a graphical method.

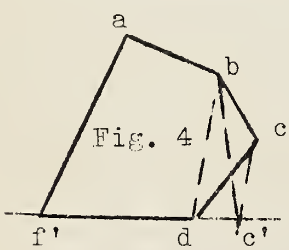
Consider the irregular area, abcdef, (fig. 1.) Find its area. Start by taking one side, as de, and prolong it in both directions. Then find f' as follows: draw ff' parallel to ae. Draw af'. As can be readily seen, • aef = aef'. (One side, ae, in common, and their altitudes are equal.) Then we can show a figure abcef', which is equal in area to the original figure, but has one less side. (Fig. 3.)

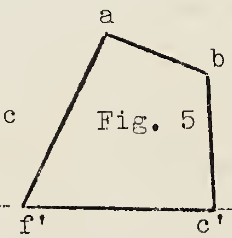


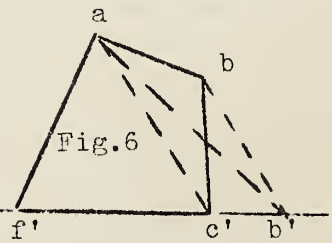


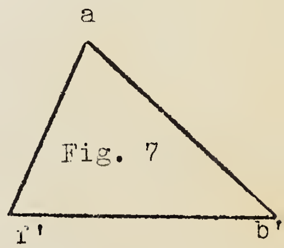


Then we take another side, as in Fig. 4, and eliminate it in a similar manner, giving the figure as in Figure 5, still the same area as the original figure. This is continued until only three sides remain, as in Fig. 7. This is a triangle, and its base and altitude can be scaled.









Note that this is an entirely graphical method, is quickly done, becomes a matter of routine when once learned, and can be taught to relatively unskilled men.

How Much Will Any I-Beam Hold?

The accompanying chart answers the above question. No computations are necessary. The chart tells how much any ordinary I-beam will hold under the very worst condition, with the load concentrated in the middle of the span as shown by the sketch on the chart. The chart is based on concentrated loading for the sake of safety.

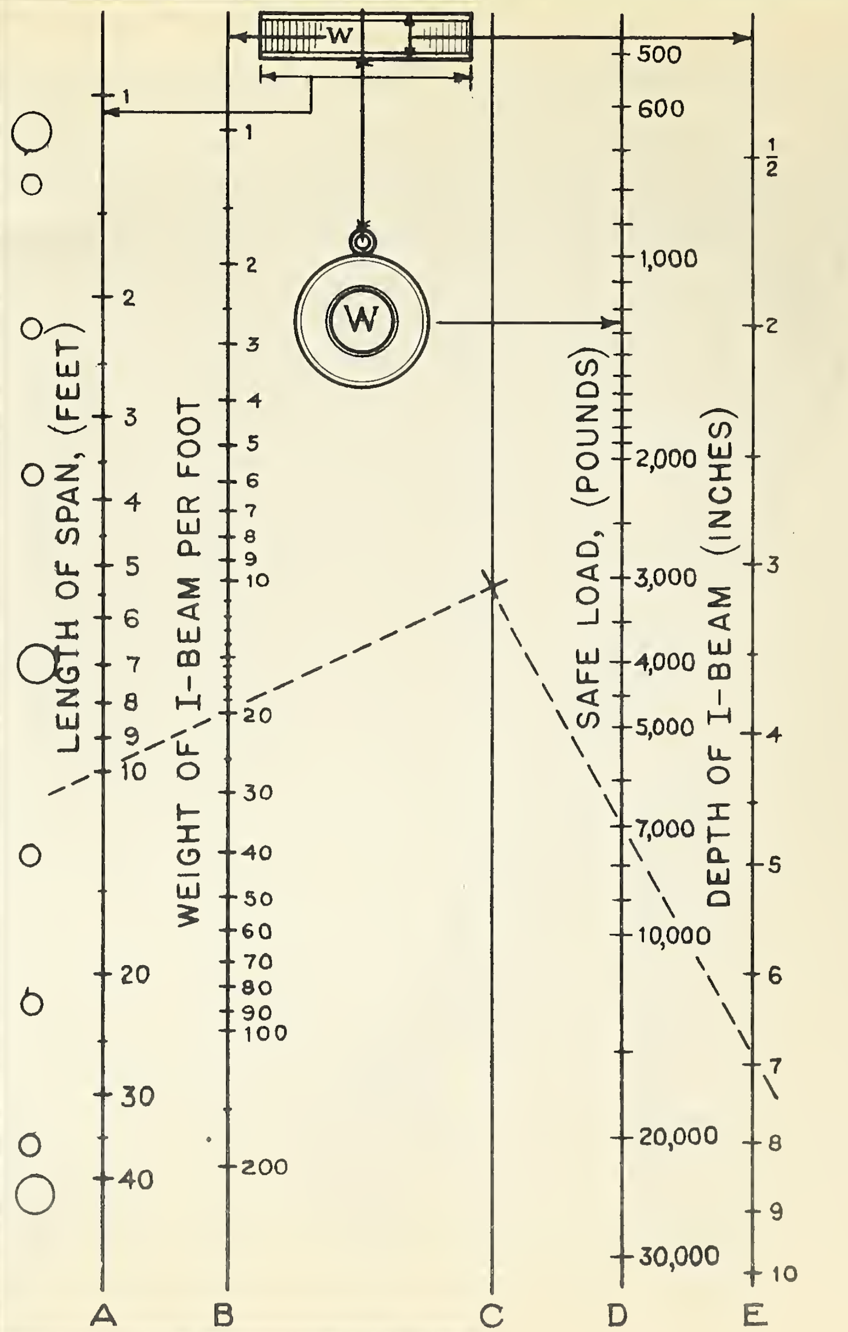
Let us suppose that a weight of 4,000 lbs. must be supported. A 7-inch I-Beam, weighing 240 lbs., is available. It is 12 feet long, and therefore weighs 20 lbs. per foot. The minimum distance between supports that can be obtained for the lifting operation is 10 feet. Is the I-Beam strong enough to lift the 4000-lb. load?

The dotted lines drawn across the chart show how the problem is solved. Run a straight line through the 10-ft. (column A) and the 20-lb. (column B) and locate the intersection in column C. Then, from that intersection in column C, run over to the 7-in. (column E). The intersection through column D shows that the I-Beam will support 7000 lbs. Since the load to be lifted is only 4000 lbs., the beam is amply strong. In fact, the reader can easily find, by applying the chart, that a 4-inch I-Beam, all other conditions being the same, would safely support the load of 4000 lbs.

Similarly, it is easy to ascertain the maximum allowable span when the factors in columns B, D and E are known. Or, the necessary weight per foot of I-Beam may be determined when the factors in columns A, D and E are known. Lastly, the depth of beam is determinable when the factors in columns A, B and D are known.

For loads that are "uniformly distributed" --not concentrated--the safe loads in column D may be multiplied by two. Thus, the above described beam will support a uniformly distributed load of 14,000 lbs., or 1400 lbs. per running ft.

W. F. Schaphorst, M.E. From "Excavating Engineer" for September, 1935.



GAUGE USED FOR CUTTING ANGLES ON
BUCK STICKS FOR BUCK AND POLE FENCE

Submitted by R. L. Clarke, Foreman
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Camp F-16-C, Grand Mesa N.F.